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KLARQUIST SPARKMAN LLP
121 S.W. SALMON STREET
SUITE 1600
PORTLAND, OR 97204

EXAMINER	
RIDER, JUSTIN W	

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2626	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/642,550	THUMPUDI ET AL.	
	Examiner	Art Unit	
	JUSTIN W. RIDER	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *116-121,123-127,129-134,136-141,143-148,150-154 and 168-179* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *116-121,123-127,129-134,136-141,143-148,150-154 and 168-179* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/ are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 2.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Response to Amendment

1. In response to the Office Action mailed 07 August 2007, applicant submitted a response filed 28 December 2007, in which the applicant amended claim 132 without adding new matter.

Response to Arguments

2. *Regarding 35 U.S.C. § 112 rejection*

As per amendment, the 35 U.S.C. § 112 rejection made in the previous Office Action has been withdrawn.

Regarding Claims 129, 170 and 176

Applicant asserts that **Tsutsui** fails to teach or suggest selecting multi-channel transforms from a plurality of multi-channel transforms. The examiner points to Fig. 3, modules 1203, 1204 and 1205 that shows the use of three transforms for an input multi-channel signal.

Applicant further remarks that multi-channel processing by means of individually processing each of a plurality of monaural signals within a multi-channel input signal is not a multi-channel transformation. The transformation processing is, however, being explicitly performed on a multi-channel input in line with the definition as claimed and as interpreted by the examiner. Therefore, the examiner asserts that the teachings of **Tsutsui** do teach the limitations as claimed in claims 129, 170 and 176.

Regarding Claims 143, 150, 172-173, and 178-179

As mentioned, the examiner does re-assert **Tsutsui's** recitation of plural transformations as above. Additionally, the arguments supplied on pages 13-14 of Remarks are believed to be covered by the above response.

Regarding Claims 132 and 146

The examiner agrees that the previous Office Action fails to address the limitation concerning the use of Hadamard transforms.

Regarding Claims 120-131, 133-134, 144-145, 147-148 and 151-154

As mentioned, the examiner does re-assert **Tsutsui's** recitation of plural transformations as above. Additionally, the arguments supplied on page 14 of Remarks are believed to be covered by the above response.

Regarding Claims 116, 123, 168-169, and 174-175

As mentioned, the examiner does re-assert **Tsutsui's** recitation of plural transformations as above. Additionally, the arguments supplied on page 15 of Remarks are believed to be covered by the above response.

Regarding Claim 121

While the examiner believes the arguments with respect to claim 121 are pertinent, channel correlation calculations could be taking place within individual channels *or* across plural

channels. For the sake of clarity, wording that positively recites cross-channel correlation operations would suffice.

Regarding Claims 117-120 and 124-127

As mentioned, the examiner does re-assert **Tsutsui's** recitation of plural transformations as above. Additionally, the arguments supplied on page 16 of Remarks are believed to be covered by the above response.

Regarding Claims 136, 171 and 177

As mentioned, the examiner does re-assert **Tsutsui's** recitation of plural transformations as above. Additionally, **Geiger** was brought in combination to obviate the ability to include a customized transform as a possible option for signal transformations in order to increase the accuracy and efficiency of coding operations.

Regarding Claims 137-141

As mentioned, the examiner does re-assert **Tsutsui's** recitation of plural transformations as above. Additionally, the arguments supplied on page 17 of Remarks are believed to be covered by the above response.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 146 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. This is the same as the 112 rejection of claim 132 in the previous Office Action in which the examiner inadvertently omitted the same rejection for claim 146

Tsutsui et al. (US Patent No. 6,353,807), referred to as **Tsutsui** hereinafter, does disclose the use of a DCT variant as a pre-defined transform (col. 17, lines 45-47). However, the rationale for applying an identity transform or omitting a transform altogether is unclear due to the fact that it is common knowledge that performing an identity transform is equivalent to not performing a transformation and simply moving on to the next step in the process (specification, p. 10, *'The encoder (100) allows two kinds of transforms: (a) an identity transform (which is equivalent to no transform at all) ; '*).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 129-131, 133-134, 143-145, 147-148, 150-154, 170, 172-173, 176 and 178-179 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Tsutsui et al. (US Patent No. 6,353,807)** referred to as **Tsutsui** hereinafter.

Claims 129, 170 and 176: **Tsutsui** discloses an encoder, computer-readable medium and computer-implemented method in a multi-channel encoder, comprising:

i. receiving multi-channel audio data (FIG. 29; col. 7, lines 28-31, *'by coding time-series information signals corresponding to a plurality of channels... '*);

ii. selecting a multi-channel transform from among plural available types of multi-channel transforms, wherein the plural available types include three or more pre-defined transforms (col. 7, line 65 - col. 8, line 13, *'According to a further aspect of the present invention, there is provided a code transform control method in which a plurality of code transform operations for transforming a first code string into a second code string are selectable. The code transform control method includes the step of selecting one of the plurality of code transform operations based on input transform-operation-rate control information. '*); and

iii. performing the selected transform on the audio data (col. 7, line 65 - col. 8, line 13, *'According to a further aspect of the present invention, there is provided a code transform control method in which a plurality of code transform operations for transforming a first code string into a second code string are selectable. The code transform control method includes the step of selecting one of a plurality of code transform operations based on input transform-operation-rate control information. '* [emphasis supplied]).

While **Tsutsui** discloses the claimed limitations as above, it is also taught that the transform is performed on a first code string to obtain a second code string and not necessarily directly obtained from a time-series input. However, the claims would have been obvious because the *first* code string was, however derived from an input multi-channel time-series signal and this technique is particularly known and would be readily applicable to the capabilities of one skilled in the art of audio coding and in effect, a similar predictable result is obtained.

Claim 130: Tsutsui discloses a computer-implemented method as per claim 129 above, further disclosing wherein the multi-channel audio data is in two channels (col. 31, lines 27-30, *'to be used for multi-channel signals, such as stereo signals.'* [emphasis supplied]).

Claim 131: **Tsutsui** discloses a computer-implemented method as per claim 129 above, further disclosing wherein the multi-channel audio data is in more than two channels (col. 31, lines 27-30, *'to be used for multi-channel signals, such as stereo signals.'* [emphasis supplied]).

Claim 133: **Tsutsui** discloses a computer-implemented method as per claim 129 above, wherein the plural available types further include a general unitary transform (It is noted that there appears to be no specific disclosure in applicant's specification for the inclusion of a 'General Unitary Transform'; however, a DCT or its variants is a commonly used unitary transform and is taught by **Tsutsui** in col. 17, lines 45-47.).

Claim 134: **Tsutsui** discloses a computer-implemented method as per claim 129 above, further comprising outputting information indicating the selected transform (col. 42, lines 11-18, *'More specifically, an instruction 847 is input into the input means and is output as a signal 848. Upon receiving the signal 848, the control means 1848 generates a signal 849 and switches between the spectral-signal transform means 1844 and the spectral-signal transform means 1843 based on the signal 849.'* [emphasis supplied]).

Claims 143-145, 147-148, 172 and 178: **Tsutsui** discloses multi-channel coding system in which the encoding process is claimed in claims 129-134, 170 and 176. **Tsutsui** further discloses a multi-channel decoder and method for decoding that performs the inverse functions of those disclosed in order to encode an input multi-channel audio signal (FIGs. 5, 7, 17; col. 18, line 21 - col. 19, line 7). Therefore, it is inherent that inverse operations are taught for

effectively reconstructing a signal as coded in claims 129-134, 170 and 176 pertaining to the encoding portion of an encoding/decoding process.

Claims 150-154, 173 and 179: **Tsutsui** discloses multi-channel coding system in which the encoding process is claimed in claims 136-141, 171 and 177. **Tsutsui** further discloses a multi-channel decoder and method for decoding that performs the inverse functions of those disclosed in order to encode an input multi-channel audio signal (FIGs. 5, 7, 17; col. 18, line 21 - col. 19, line 7). **Tsutsui** further discloses a multi-channel decoder and method for decoding that performs the inverse functions of those disclosed in order to encode an input multi-channel audio signal. Therefore, it is inherent that inverse operations are taught for effectively reconstructing a signal as coded in claims 136-141, 171 and 177 pertaining to the encoding portion of an encoding/decoding process.

7. Claims 116-121, 123-127, 168-169 and 174-175 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Tsutsui** in view of **Graupe (US Patent No. 5,822,370)** referred to as **Graupe** hereinafter.

Claims 116, 168 and 174: **Tsutsui** discloses an encoder, computer-readable medium and computer-implemented method in a multi-channel encoder, comprising:

i. receiving multi-channel audio data (FIG. 29; col. 7, lines 28-31, *'by coding time-series information signals corresponding to a plurality of channels... '*); and

ii. selecting a multi-channel transform from among plural available types of multi-channel transforms (col. 7, line 65 - col. 8, line 13, *'According to a further aspect of the present invention, there is provided a code transform control method in which a plurality of code*

transform operations for transforming a first code string into a second code string are selectable. The code transform control method includes the step of selecting one of a plurality of code transform operations based on input transform-operation-rate control information.').

However, **Tsutsui** fails to but **Graupe** does, specifically disclose selectively turning the selected transform on/off at plural frequency bands; and performing the selected transform on the audio data at one or more of the plural frequency bands at which the selected transform is on, wherein the encoder performs no transform on the audio data at zero or more of the plural frequency bands at which the selected transform is off (col. 5, lines 48-58).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to include the teachings of **Graupe** in the system of **Tsutsui** because **Graupe** provides a method of compressing and transmitting high fidelity signals over narrow standard telephone bandwidths (col. 1, lines 5-10).

Claims 117-118: Claims 117 and 118 are similar in scope and content to that of claims 130 and 131, respectively and so therefore are rejected under the same rationale.

Claims 119-120: **Tsutsui** discloses a method as per claim 116 above, however **Tsutsui** fails to but **Graupe** does, specifically disclose outputting a mask including one bit for each of the plural frequency bands and further comprising outputting a single bit and, if the selected transform is not turned on at all of the plural frequency bands, a mask including one bit for each of the plural frequency bands. (col. 5, lines 48-58, *'The wavelet transform circuit (190-a) uses b_i to determine whether or not to perform wavelet transforms on signals S_{A-E} (t). If b_i is a "0", no transforms are performed.'*).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to include the teachings of **Graupe** in the system of **Tsutsui** because of the reasons outlined above.

Claim 121: **Tsutsui** discloses a method as per claim 116 above, however **Tsutsui** fails to but **Graupe** does, specifically disclose wherein the encoder selectively turns the selected transform on/off based at least in part upon channel correlation measurements at the plural frequency bands (col. 5, line 60 - col. 6, line 8, ex. *'the band rearrangement circuit (190-c) first shifts the spectrum of the output of both bands A and B into band A by compressing the spectrum of bands A and B by taking advantage of the property of WT of speech in narrow bands... '*).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to include the teachings of **Graupe** in the system of **Tsutsui** because of the reasons outlined above.

Claims 123-127, 169 and 175: **Tsutsui** discloses multi-channel coding system in which the encoding process is claimed in claims 123-127, 169 and 175. **Tsutsui** further discloses a multi-channel decoder and method for decoding that performs the inverse functions of those disclosed in order to encode an input multi-channel audio signal (FIGs. 5, 7, 17; col. 18, line 21 - col. 19, line 7). **Tsutsui** further discloses a multi-channel decoder and method for decoding that performs the inverse functions of those disclosed in order to encode an input multi-channel audio signal. Therefore, it is inherent that inverse operations are taught for effectively reconstructing a signal as coded in claims 123-127, 169 and 175 pertaining to the encoding portion of an encoding/decoding process.

8. Claims 132 and 146 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Tsutsui** in view of **López et al., 'Software Toolbox for Multichannel Sound Reproduction', Proceedings of Digital Audio Effects Conference (DAFX), December 1998, Barcelona, Spain** referred to as **López** hereinafter.

Claims 132 and 146: **Tsutsui** discloses a method as per claims 129 and 143 above, disclosing wherein the pre-defined transforms include a DCT variant. However, **Tsutsui** fails to but **López** does specifically disclose the inclusion of a Hadamard transform as a viable option (page 4 of 4, Section 4: Algorithms employed) within a versatile software toolbox for multichannel sound signal processing.

Therefore, it would have been obvious to one possessing ordinary skill in the art at the time of invention to include the teachings of **López** in the method of **Tsutsui** because it specifically decreases the number of operations needed for computing sequence correlations (Section 4).

9. Claims 136-141, 171 and 177 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Tsutsui** in view of **Geiger et al. 'Audio Coding based on Integer Transforms', Audio Engineering Society Convention Paper 5471, September 21-24, 2001** referred to as **Geiger** hereinafter.

Claims 136, 171 and 177: **Tsutsui** discloses an encoder, computer-readable medium and computer-implemented method in a multi-channel encoder, comprising:

i. receiving multi-channel audio data (FIG. 29; col. 7, lines 28-31, *'by coding time-series information signals corresponding to a plurality of channels...'*);

ii. selecting a multi-channel transform from among plural available types of multi-channel transforms, wherein the plural available types include plural pre-defined transforms (col. 7, line 65 - col. 8, line 13, *'According to a further aspect of the present invention, there is provided a code transform control method in which a plurality of code transform operations for transforming a first code string into a second code string are selectable. The code transform control method includes the step of selecting one of the plurality of code transform operations based on input transform-operation-rate control information.'*); and

iii. performing the selected transform on the audio data (col. 7, line 65 - col. 8, line 13, *'According to a further aspect of the present invention, there is provided a code transform control method in which a plurality of code transform operations for transforming a first code string into a second code string are selectable. The code transform control method includes the step of selecting one of a plurality of code transform operations based on input transform-operation-rate control information.'* [emphasis supplied]).

While **Tsutsui** discloses the claimed limitations as above, it is also taught that the transform is performed on a first code string to obtain a second code string and not necessarily directly obtained from a time-series input. However, the claims would have been obvious because the *first* code string was, however derived from an input multi-channel time-series signal and this technique is particularly known and would be readily applicable to the capabilities of one skilled in the art of audio coding and in effect, a similar predictable result is obtained.

However, **Tsutsui** fails to, but **Geiger** does, specifically disclose wherein a custom transform is used in transforming input audio data by means of utilizing a Givens rotation to perform said transform (p. 2, *'This technique allows to approximate Givens Rotations by*

mapping integers to integers in a reversible way. Therefore every transform that can be decomposed into Givens Rotations can be approximated by a lossless integer transform.').

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to include the teachings of **Geiger** in the system of **Tsutsui** because **Geiger** proposes an optimal transform for lossless audio coding that provides perfect reconstruction, a low range of spectral values, good frequency selectivity as well as a fast algorithm (p. 1-2, Introduction); all of which provide optimal conditions for effective audio coding.

Claims 137-138: Claims 137 and 138 are similar in scope and content to that of claims 130 and 131, respectively and so therefore are rejected under the same rationale.

Claim 139: Claim 139 is similar in scope and content to that of claim 134 above and so therefore is rejected under the same rationale.

Claim 140: **Tsutsui** discloses a computer-implemented method as per claim 139 above, wherein the output information includes information for individual elements of the selected transform (col. 42, lines 35-55 disclose a method of which individual elements are selected, including rate and quality determinations and appropriate filter selections.).

Claim 141: **Tsutsui** discloses a computer-implemented method as per claim 136 above, however failing to specifically disclose wherein the encoder selects one of the plural pre-defined transforms if performance of the selected pre-defined transform is suitably close to performance of the custom transform in terms of redundancy removal. However, the examiner is taking Official Notice that since pre-defined transforms (e.g. DCT and variants) are less complex than having to customize a transform 'on-the-fly' that it would have been obvious to one having

ordinary skill in the art at the time of invention to use a pre-determined transform in place of a custom transform because the computational cost and efficiency is greatly improved.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JUSTIN W. RIDER whose telephone number is (571)270-1068. The examiner can normally be reached on Monday - Friday 8:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Hudspeth can be reached on (571) 272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

J.W.R.
26 February 2008

DAVID HUDSPETH
SUPERVISORY PATENT EXAMINER